ULTIMATE BONDING WITH HEAT ACTIVATED FILMS

Our Tape Solutions for Extreme Requirements
As world market leader for many application areas and with over 125 years of experience in coating technology as well as the production of self-adhesive system solutions, we have developed an in-depth understanding of our customers’ processes and requirements.

This allows us not only to offer high-level technical support, but to always choose the right product for each individual application.

Today’s demands towards bonding solutions in the automotive industry are more challenging than ever. A special focus lies on resilience, chemical resistance, and high-level bonding strengths.

What is tesa® HAF?

tesa® HAF is not tacky at room temperature. The reactive adhesive film is only activated by adding temperature and a bonding strength of up to 30 N/mm² can be achieved. After full curing tesa® HAF shows an excellent resistance against oil and chemicals even at high temperatures.

tesa® HAF is available in two versions:

1. **Heat Activated Film (HAF)**
   tesa® HAF has an adhesive layer containing nitrile rubber and a phenolic resin. By supplying heat, a chemical reaction is started that creates a securely bonded system. The softening point is 70°C. By reaching 120°C, the curing process is irreversible. When the curing process is completed, the reactive tesa® HAF is resistant to temperatures up to 350°C and can withstand a variety of different chemicals.

2. **Low Temperature Reactive HAF (LTR HAF)**
   tesa® LTR HAF is based on a reactive adhesive that is activated at low temperature. The softening point is 50°C. By reaching 75°C a chemical reaction starts to form a securely bonded system. LTR HAF is designed for structural bonding of materials that are sensitive to high temperature and pressure.

**tesa® HAF – Assortment at a glance**

Every tesa® HAF product is specifically developed for the market requirements and offers the following advantages on a variety of substrates:

**HAF:**
- Extremely high bonding strengths up to 30 N/mm²
- High resilience
- Resistance against oil and solvents
- Aging/UV/temperature resistant after curing
- Even and precise bonding
- Fast and clean solution
- Suitable for die-cutting

**LTR HAF:**
- High bonding strengths
- Outstanding push-out, peel, and shock resistance
- Structural bonding of materials sensitive to heat and pressure
- Low VOC
tesa® HAF – Application examples

**Bonding of friction materials in clutches and transmissions**
Where temperature variation, steady mechanical load, and chemicals cause high stress, a reliable bond is needed.

Requirements:
- Temperature resistance of up to 350°C after full curing of HAF
- High cohesiveness at frictional heat
- High chemical resistance against oil and fuel
- Long-term stability at high load
- No interference with bonded substrates
- Bonding with exact edges

**Bonding of magnets to rotors**
In electric motors, where changing loads apply, permanent magnets are often used to create a magnetic field.

Requirements:
- Long-term stability also at high load
- High chemical resistance
- A constant and even adhesive layer
- High heat resistance
- High stability at small bonding surface

**Bonding of brake shims for disc brakes**
In order to reduce noise resulting from a brake process, brake shims are bonded to the brake pad backing plate with an adhesive layer.

Requirements:
- High temperature resistance
- Good damping properties
- Suitability for die-cutting
- Long-term stability at high load
- Good adhesion to rubber, metal, and coated backing plates

**Bonding of fabrics with LTR HAF**
For the bonding of heat-sensitive materials like leather and fabrics LTR HAF is the right solution.

Requirements:
- Low VOC for car interior
- Good adhesion to fabrics and heat-sensitive materials
- Clean process
- Flexible feel after application
- Short curing time

**Application support**
In addition to product consulting, our technical experts offer on-site support and, if requested, customer-specific analyses and assessment under laboratory conditions in our research center:

- Professional equipment like laminating machines and heat presses
- State-of-the-art testing facilities
- Climatic chambers for stress tests under predefined climatic conditions
- Comprehensive databases regarding test methods and applications

tesa® products prove their impressive quality day in, day out in demanding conditions and are regularly subjected to strict controls. All technical information and data above mentioned are provided to the best of our knowledge on the basis of our practical experience. They shall be considered as average values and are not appropriate for a specification. Therefore tesa SE can make no warranties, express or implied, including, but not limited to any implied warranty of merchantability or fitness for a particular purpose. The user is responsible for determining whether the tesa® product is fit for a particular purpose and suitable for the user’s method of application. If you are in any doubt, our technical support staff will be glad to support you.
Advantages

Adhesive strength
- Shear strength
- Bonding strength

Reliability under extreme environmental conditions
- Resistance to chemicals and oil
- Resistance to high temperatures

Sealing function
- Prevention of contamination by dust and humidity

No oozing
- Very precise bonding also on narrow bonding areas
- No adhesive residues
- Defined adhesive thickness

Fast and easy application
- Higher production output
- No or short curing times
- Process decoupling possible

Suitable for die-cutting

Healthy working environment and clean production sites

---

Processing

No oozing

Test method

For tesa® HAF the dynamic shear strength is measured as this is the primary load type for constructive bonding.

For further details on the test method, see illustration.

tesa® HAF – In comparison

tesa® HAF offers bonding strengths comparable to liquid high-performance adhesives and is five times stronger than conventional double-sided adhesive tape solutions.

Tesafilm reactive HAF Double-sided tape solutions Liquid high-performance adhesive

tesa® HAF – Application process

For the application of HAF, the adjustment of the parameters time, temperature, and applied pressure is of high importance:

- The process time can be reduced by increasing the temperature.
- For reactive HAF, it is important to increase the pressure at higher temperatures to avoid bubble formation.

The following illustration shows reference values for the application process of tesa® HAF.

Pre-lamination

<table>
<thead>
<tr>
<th></th>
<th>Reactive HAF</th>
<th>LTR HAF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing methods</td>
<td>Hot-roll laminator Heat press</td>
<td>Hot-roll laminator Heat press</td>
</tr>
<tr>
<td>Machine settings</td>
<td>180°C–230°C 0.5–2.5 bar 0.5–10 m/min</td>
<td>50°C–60°C 1–3 bar 0.5 m/min</td>
</tr>
</tbody>
</table>

Bonding

<table>
<thead>
<tr>
<th></th>
<th>Reactive HAF</th>
<th>LTR HAF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Heat press</td>
<td>Heat press</td>
</tr>
<tr>
<td>Optional: post-curing</td>
<td>180°C–230°C No pressure 30–60 min</td>
<td>At room temperature 24 hours</td>
</tr>
</tbody>
</table>

Application process example for tesa® HAF with heat press:

1. Pre-lamination

2. Liner removal

3. Positioning of substrates

4. Bonding by time, temperature, and pressure

5. Optional: post-curing
Our management system is certified according to the standards ISO 9001, ISO/TS 16949, and ISO 14001. All our products delivered to automotive customers are listed in the International Material Data System (IMDS).